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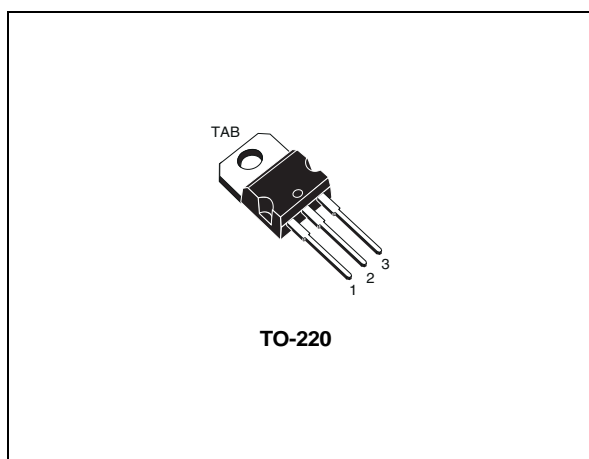
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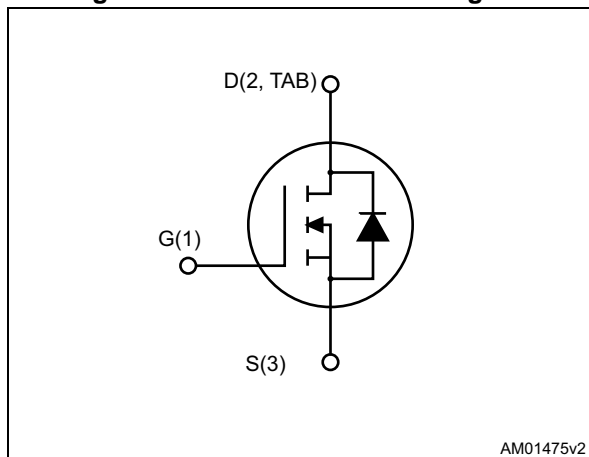
# STP240N10F7

## N-channel 100 V, 2.85 mΩ typ., 110 A STripFET™ F7 Power MOSFET in a TO-220 package

Datasheet - production data



**Figure 1. Internal schematic diagram**



### Features

Order code	V <sub>DS</sub>	R <sub>DS(on)</sub> max.	I <sub>D</sub>
STP240N10F7	100 V	3.2 mΩ	110 A

- Ultra low on-resistance
- 100% avalanche tested

### Applications

- High current switching applications

### Description

This N-channel Power MOSFET utilizes the STripFET™ F7 technology with an enhanced trench gate structure that results in very low on-state resistance, while also reducing internal capacitance and gate charge for faster and more efficient switching.

**Table 1. Device summary**

Order code	Marking	Package	Packaging
STP240N10F7	240N10F7	TO-220	Tube

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Electrical ratings

# 1 Electrical ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-source voltage	100	V
$V_{GS}$	Gate-source voltage	$\pm 20$	V
$I_D^{(1)}$	Drain current (continuous) at $T_C = 25^\circ\text{C}$	110	A
$I_D^{(1)}$	Drain current (continuous) at $T_C=100^\circ\text{C}$	110	A
$I_{DM}^{(2)}$	Drain current (pulsed)	440	A
$P_{TOT}$	Total dissipation at $T_C = 25^\circ\text{C}$	300	W
$E_{AS}^{(3)}$	Single pulse avalanche energy	500	mJ
$T_j$	Operating junction temperature	- 55 to 175	$^\circ\text{C}$
$T_{stg}$	Storage temperature		

1. Current limited by package.
2. Pulse width limited by safe operating area.
3. Starting  $T_j=25^\circ\text{C}$ ,  $I_d=45\text{A}$ ,  $V_{dd}=50\text{V}$

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	0.5	$^\circ\text{C/W}$
$R_{thj-amb}$	Thermal resistance junction-ambient max	62.5	$^\circ\text{C/W}$

Electrical characteristics

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## 2 Electrical characteristics

( $T_{CASE} = 25\text{ }^{\circ}\text{C}$  unless otherwise specified).

Table 4. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0, I_D = 250\text{ }\mu\text{A}$	100			V
$I_{DSS}$	Zero gate voltage drain current	$V_{GS} = 0, V_{DS} = 100\text{ V}$			1	$\mu\text{A}$
		$V_{GS} = 0, V_{DS} = 100\text{ V}, T_C = 125^{\circ}\text{C}$			100	$\mu\text{A}$
$I_{GSS}$	Gate body leakage current	$V_{DS} = 0, V_{GS} = +20\text{ V}$			100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2.5		4.5	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}, I_D = 60\text{ A}$		2.85	3.2	m $\Omega$

Table 5. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input capacitance	$V_{GS} = 0, V_{DS} = 25\text{ V}, f = 1\text{ MHz}$	-	11550	-	pF
$C_{oss}$	Output capacitance		-	2950	-	pF
$C_{riss}$	Reverse transfer capacitance		-	217	-	pF
$Q_g$	Total gate charge	$V_{DD} = 50\text{ V}, I_D = 110\text{ A}, V_{GS} = 10\text{ V}$ (see <a href="#">Figure 14</a> )	-	160	-	nC
$Q_{gs}$	Gate-source charge		-	48	-	nC
$Q_{gd}$	Gate-drain charge		-	38	-	nC

Table 6. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 50\text{ V}, I_D = 90\text{ A}, R_G = 4.7\text{ }\Omega, V_{GS} = 10\text{ V}$ (see <a href="#">Figure 13</a> , <a href="#">Figure 18</a> )	-	49	-	ns
$t_r$	Rise time		-	139	-	ns
$t_{d(off)}$	Turn-off delay time		-	110	-	ns
$t_f$	Fall time		-	112	-	ns

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**Electrical characteristics**
**Table 7. Source drain diode**

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain current		-		110	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)		-		440	A
$V_{SD}^{(2)}$	Forward on voltage	$V_{GS}=0, I_{SD}=110\text{ A}$	-		1.2	V
$t_{rr}$	Reverse recovery time	$I_{SD}=110\text{ A},$ $di/dt = 100\text{ A}/\mu\text{s},$ $V_{DD}=80\text{ V}, T_j=150^\circ\text{C}$ (see <a href="#">Figure 15</a> )	-	108		ns
$Q_{rr}$	Reverse recovery charge		-	315		nC
$I_{RRM}$	Reverse recovery current		-	5.8		A

1. Pulse width limited by safe operating area.

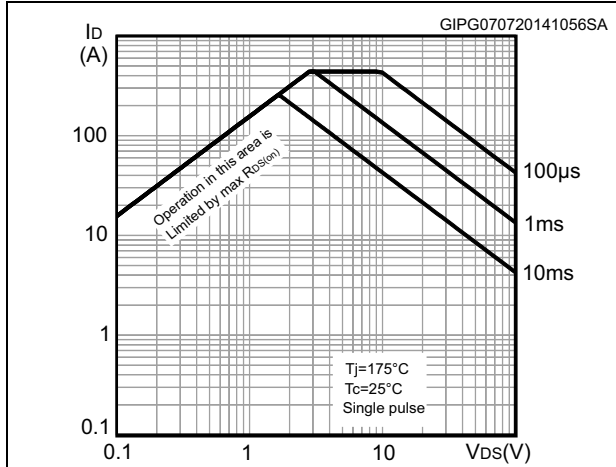
 2. Pulse duration = 300 $\mu\text{s}$ , duty cycle 1.5%

**Electrical characteristics**

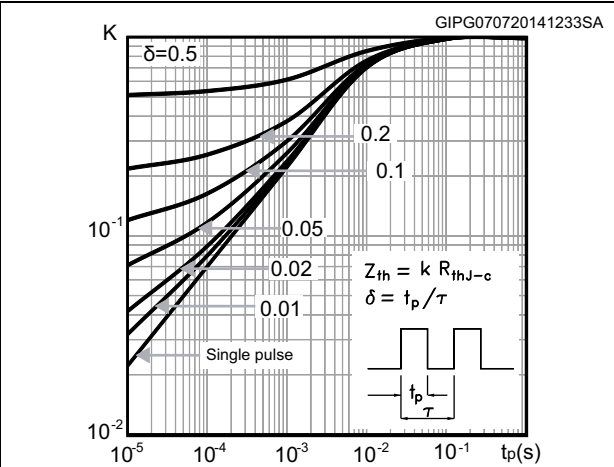
**STP240N10F7**

**2.1 Electrical characteristics (curves)**

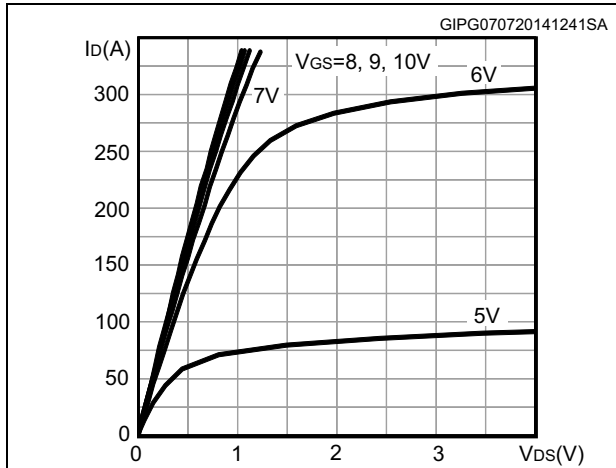
**Figure 2. Safe operating area**



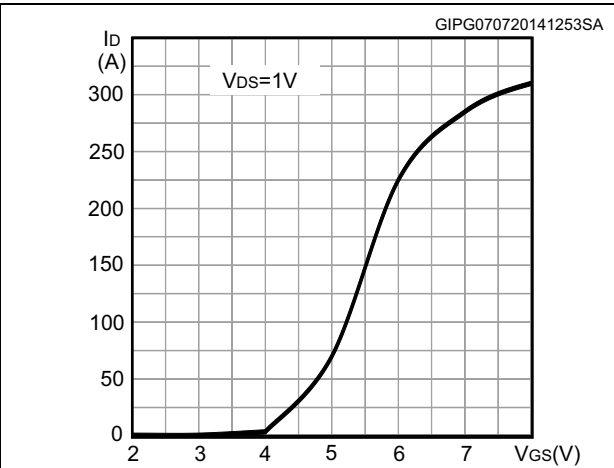
**Figure 3. Thermal impedance**



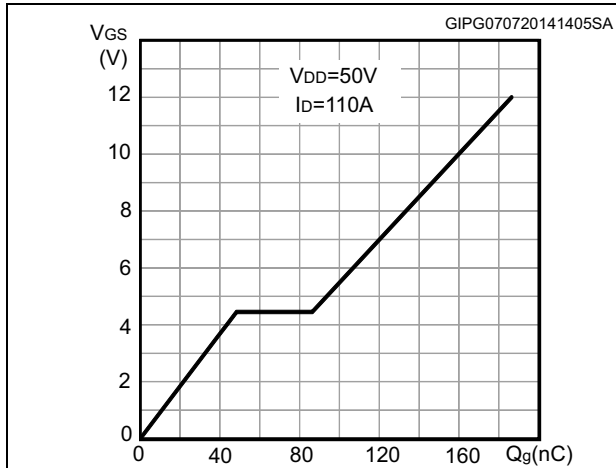
**Figure 4. Output characteristics**



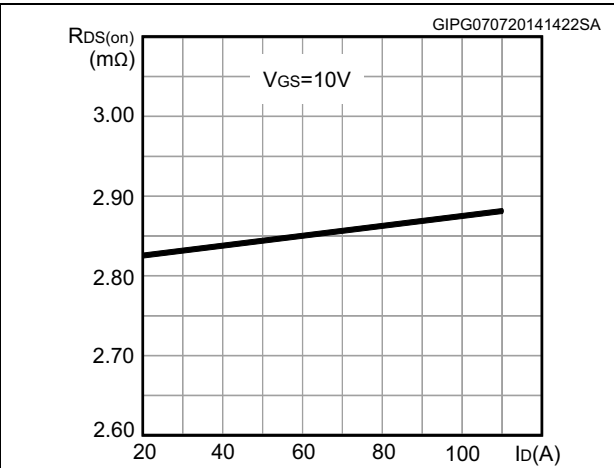
**Figure 5. Transfer characteristics**



**Figure 6. Gate charge vs gate-source voltage**



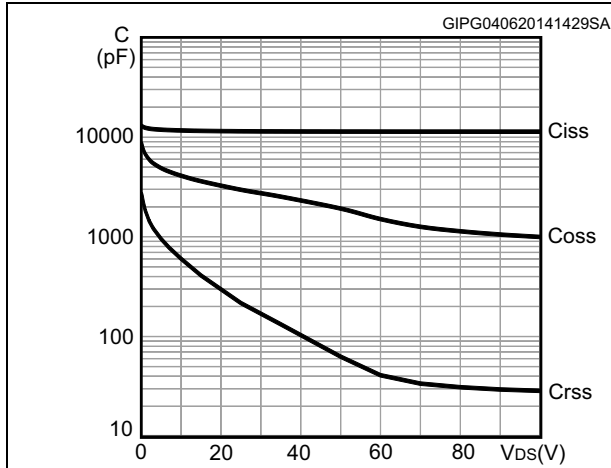
**Figure 7. Static drain-source on-resistance**



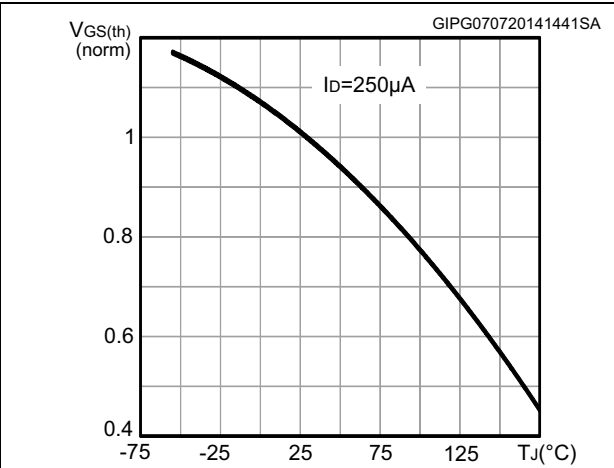
**STP240N10F7**

**Electrical characteristics**

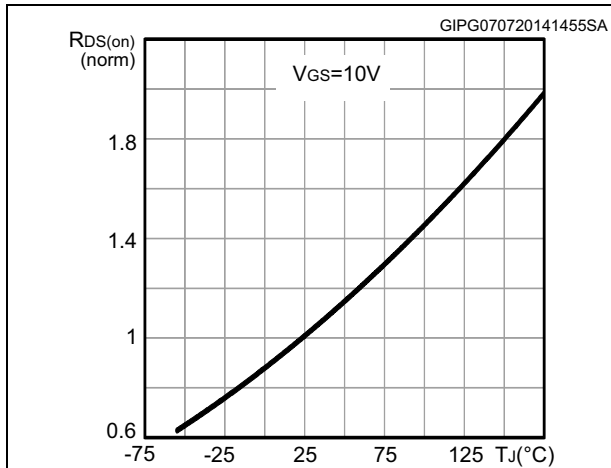
**Figure 8. Capacitance variations**



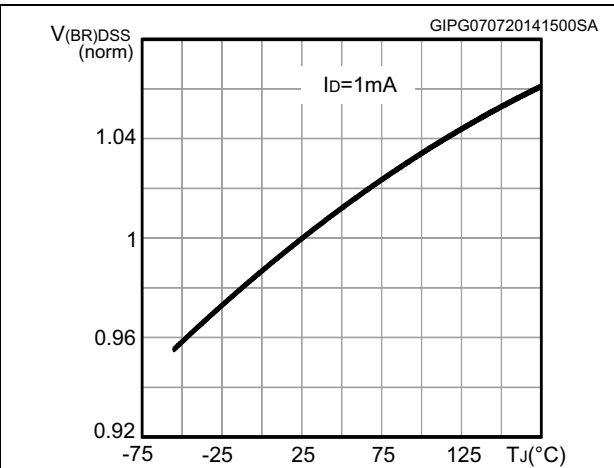
**Figure 9. Normalized gate threshold voltage vs temperature**



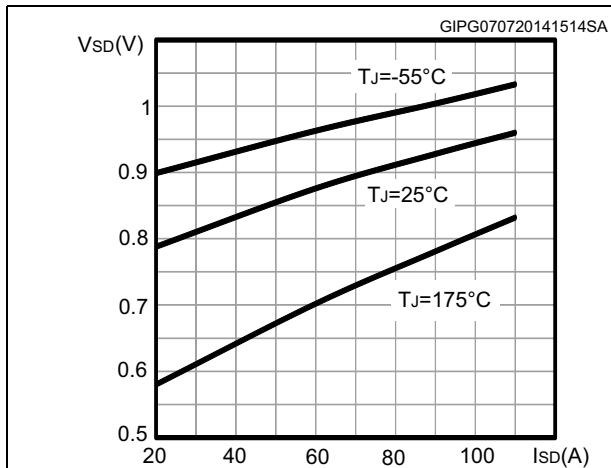
**Figure 10. Normalized on-resistance vs temperature**



**Figure 11. Normalized V(BR)DSS vs temperature**



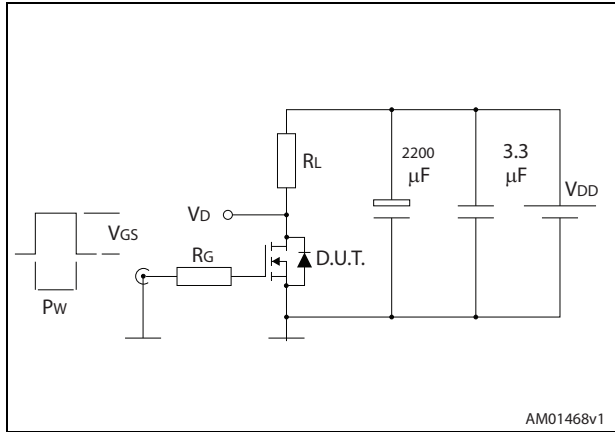
**Figure 12. Source-drain diode forward characteristics**



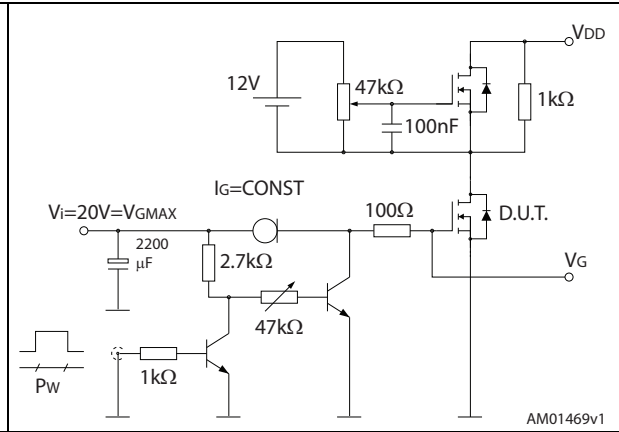


### 3 Test circuits

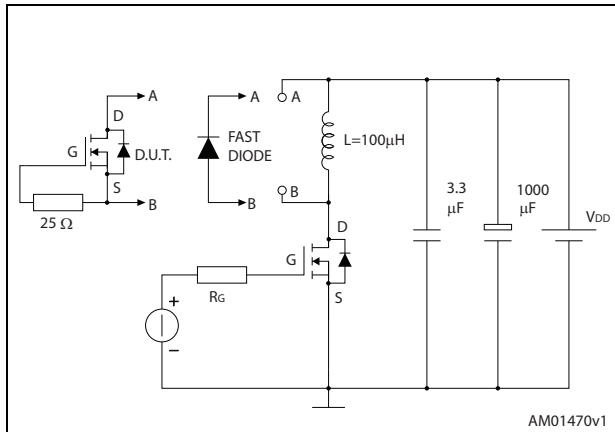
**Figure 13. Switching times test circuit for resistive load**



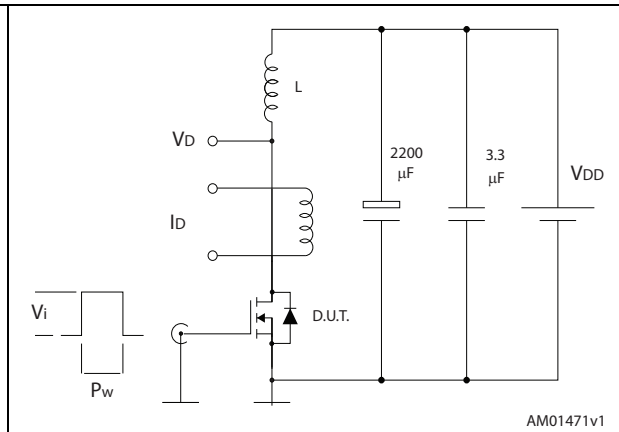
**Figure 14. Gate charge test circuit**



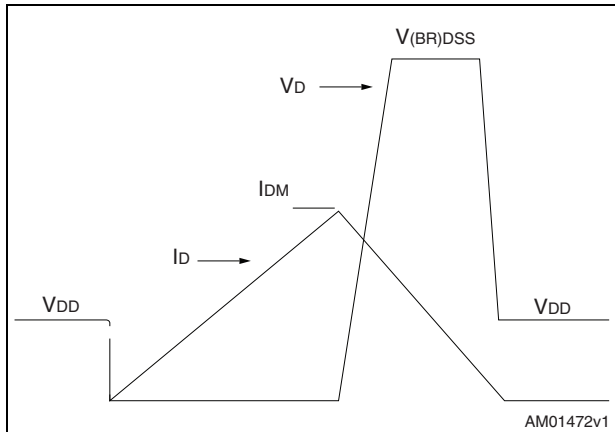
**Figure 15. Test circuit for inductive load switching and diode recovery times**



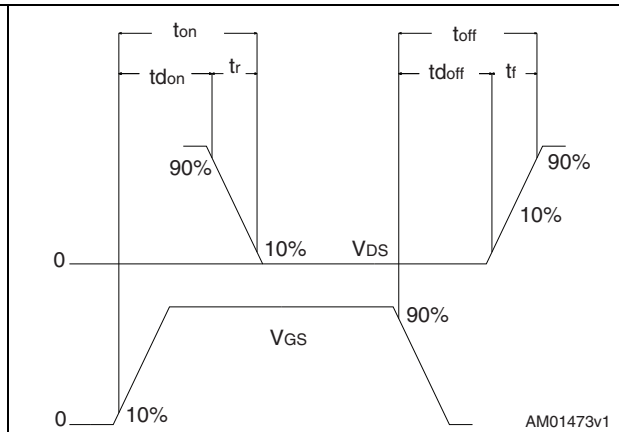
**Figure 16. Unclamped inductive load test circuit**



**Figure 17. Unclamped inductive waveform**



**Figure 18. Switching time waveform**



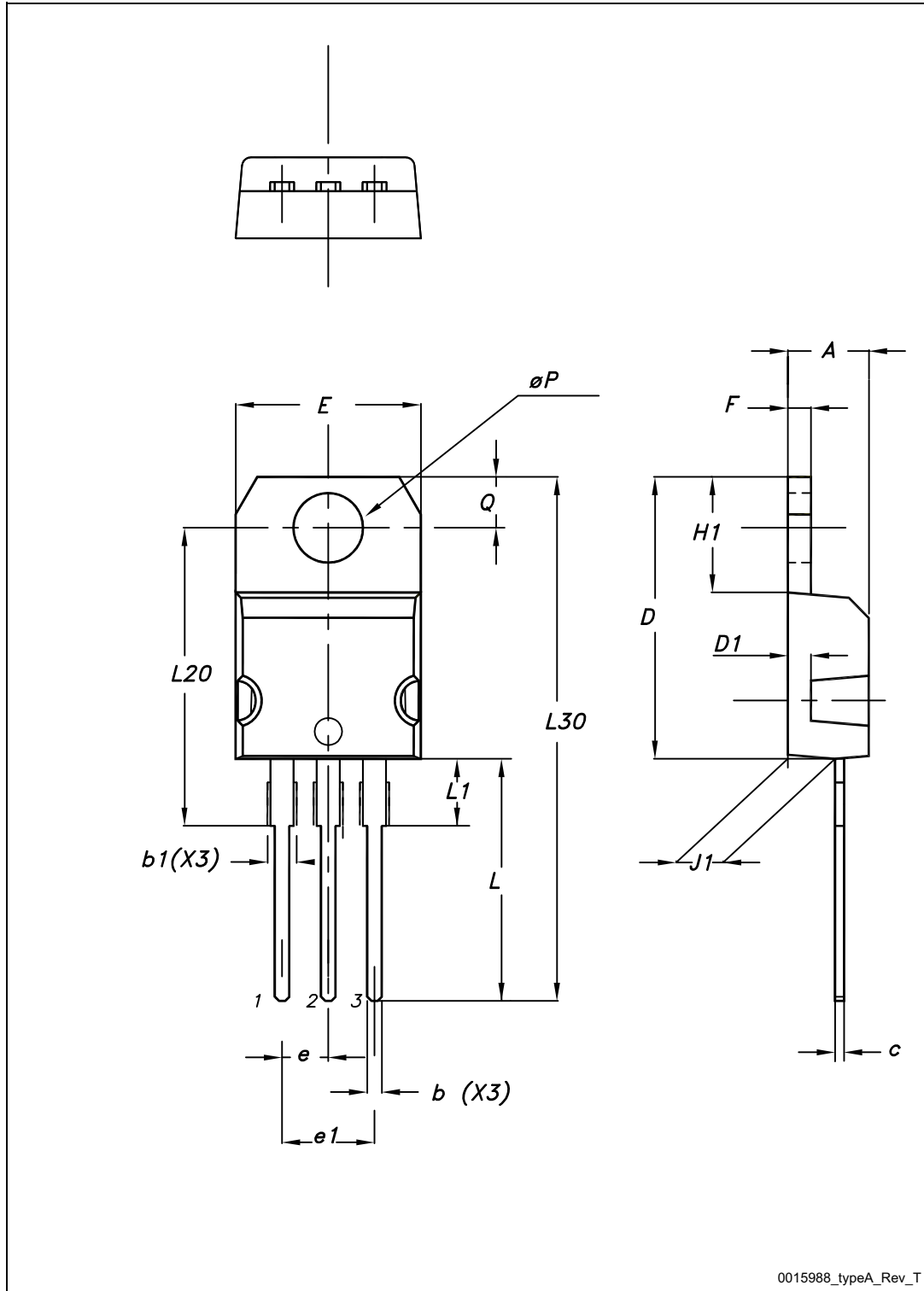
## 4 Package mechanical data

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Package mechanical data

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Figure 19. TO-220 type A drawing



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**Package mechanical data**

**Table 8. TO-220 type A mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.70
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13		14
L1	3.50		3.93
L20		16.40	
L30		28.90	
øP	3.75		3.85
Q	2.65		2.95

## 5 Revision history

Table 9. Document revision history

Date	Revision	Changes
19-Nov-2012	1	Initial version.
08-Oct-2013	2	Updated $V_{GS(th)}$ typical value in <a href="#">Table 4: On/off states</a> .
14-Jul-2014	3	<ul style="list-style-type: none"> <li>– Document status promoted from preliminary data to production data</li> <li>– Modified: title</li> <li>– Modified: <math>I_D</math> values in cover page</li> <li>– Modified: <math>I_D</math> and <math>I_{DM}</math> values in <a href="#">Table 2</a></li> <li>– Added: <math>E_{AS}</math> value and <a href="#">note 3</a> in <a href="#">Table 2</a></li> <li>– Modified: <math>I_{DSS}</math>, <math>I_{GSS}</math> and <math>V_{GS(th)}</math> values in <a href="#">Table 4</a></li> <li>– Modified: the entire typical values in <a href="#">Table 5</a> and <a href="#">6</a></li> <li>– Modified: max values and <math>I_{SD}</math> values</li> <li>– Added: <a href="#">Section 2.1: Electrical characteristics (curves)</a></li> <li>– Updated: <a href="#">Section 4: Package mechanical data</a></li> <li>– Minor text changes</li> </ul>

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